

Responses to reviewer 1#'s comments point by point

MS No.: essd-2022-436

Title: A grid dataset of leaf age-dependent LAI seasonality product (Lad-LAI) over tropical and subtropical evergreen broadleaved forests

Author(s): Xueqin Yang et al.

Summary:

General Comments of Reviewer 1#:

Yang et al's work mapped the seasonal leaf area index (LAI) of three leaf age cohorts (i.e., young, mature, and old leaves) to interpret the phenological seasonality in tropical and subtropical forests. They accomplished this by calculating gross primary productivity (GPP) from TROPOMI solar-induced chlorophyll fluorescence (SIF) observations. They validated the results with ground-based observations of leaf dynamics, and with a satellite-based vegetation index (EVI). They obtained good agreement between simulated and observed LAI.

Response: We appreciate the time and efforts of the editor and referees in reviewing this manuscript and the valuable suggestions offered. Please see our response to your comments in the supplement below.

Overall evaluation:

Comment 1:

The global relevance of the study is incontestable and is underscored by the novelty of such dataset. When published, it will be an important contribution for the understanding of tropical forests phenology. However, the manuscript needs substantial review of the English style as there are numerous language mistakes, which makes the comprehension of the text difficult.

Response: Thank you for the positive comments on the novelty of our proposed dataset. We agree with the reviewer that it is essential to ensure that our manuscript is written clearly and effectively in English. We will conduct a thorough review of our manuscript to address any language mistakes and improve the overall readability of the text.

Minor Comments:

Besides extensive review of the English style that I am not listing here, a few minor points need to be observed:

Response: Thank again for your concern on English style which we have improved thoroughly and asked a company to help polish the English language. For the minor comments raised by the reviewer, the point-to-point responses listed below.

Comment 2: Line 39: “very fine collections of monthly LAI”. What does fine collections mean? Fine-scale?

Response: Yes, “fine collections of monthly LAI” means “fine-scale collections of monthly LAI”. This has been revised in the manuscript.

Comment 3: Line 94-95: GPP is not the same thing as photosynthesis!

Response: *Totally agree. To be cautious, we have revised the sentence as “For this purpose, we simplified that canopy GPP was composed of three parts that are produced from young, mature and old leaves, respectively; and based on this assumption, GPP was expressed as a function of the sum of the product of each LAI cohort (i.e., young, mature and old leaves, denoted as LAI_{young} , LAI_{mature} , and LAI_{old} , respectively) and corresponding net CO_2 assimilation rate (An , denoted as An_{young} , An_{mature} , and An_{old} for young, mature and old leaves, respectively) (Equation 1).” (In revision Line 121-127)*

Comment 4: Figure 5: Improve figure caption by clarifying which panels (left or right) represent the simulated and observed LAIs;

Response: *We apologize for the confusion. We have revised the figure caption of Figure 5 to clarify which panels represent the simulated and observed LAIs, as follows like this one “Figure 5. Seasonality of simulated LAI_{young} , LAI_{mature} , and LAI_{old} in comparison with observed data at 3 sites in tropical Asia. (panels a, d and g) simulated LAIs; (panels b, e and h) observed LAIs; (panels c, f and i) scatterplots between simulated and observed LAIs. Limegreen dots are LAI_{young} ; green dots are LAI_{mature} ; orange dots are LAI_{old} .”*

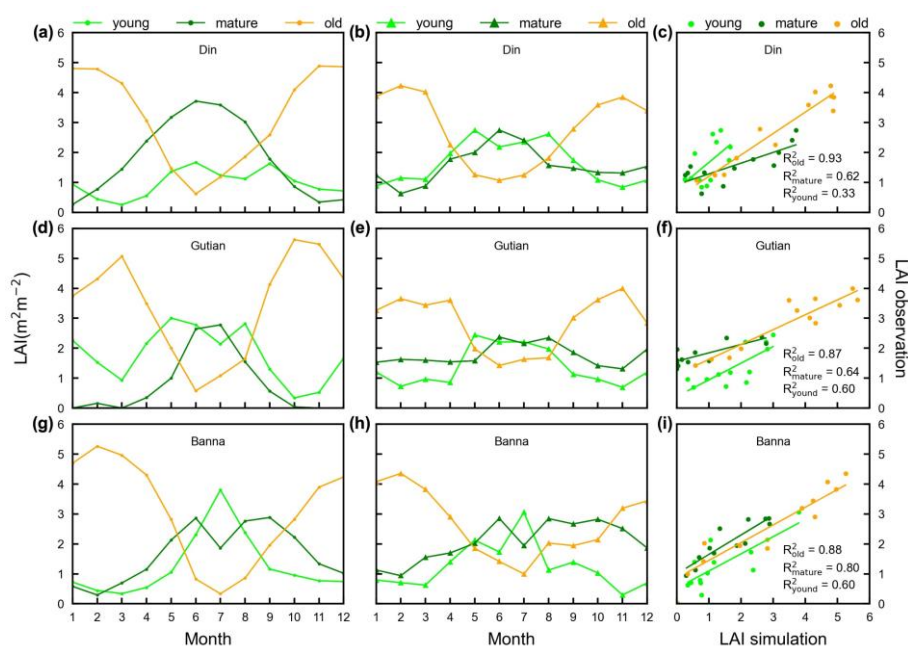


Figure 5. *Seasonality of simulated LAI_{young} , LAI_{mature} , and LAI_{old} in comparison with observed data at 3 sites in tropical Asia. (panels a, d and g) simulated LAIs; (panels b, e and h) observed LAIs; (panels c, f and i) scatterplots between simulated and observed LAIs. Limegreen dots are LAI_{young} ; green dots are LAI_{mature} ; orange dots are LAI_{old} .*

Comment 5: The authors provided the reference to Keller et al 2001 as a source for in situ samples of $V_{c,max}$, but I don't think the citation is accurate. The referred paper is about biomass estimates and allometric equations;

Response: Thank you for your careful review of the manuscript. The correct reference for in situ samples of $V_{c,max}$ is: “Menezes, J., Garcia, S., Grandis, A., Nascimento, H., Domingues, T. F., Guedes, A. V., Aleixo, I., Camargo, P., Campos, J., Damasceno, A., Dias-Silva, R., Fleischer, K., Kruijt, B., Cordeiro, A. L., Martins, N. P., Meir, P., Norby, R. J., Pereira, I., Portela, B., Rammig, A., Ribeiro, A. G., Lapola, D. M., and Quesada, C. A.: Changes in leaf functional traits with leaf age: when do leaves decrease their photosynthetic capacity in Amazonian trees? *Tree Physiology*, 42(5), 922-938, <https://doi.org/10.1093/treephys/tpab042>, 2021”. We have updated the reference accordingly in the revised version of the manuscript.

Comment 6: A key reference that should be included in the manuscript: <https://doi.org/10.1111/nph.15726>

Response: Thank you for the recommendation. We have reviewed the reference and found that the 4-year of measured data in the reference is very useful for us. We have therefore included it in the revised version of our manuscript and cited it appropriately, as follows “It has been confirmed that similar mechanism occurs in the ground-based LiDAR observation, that is, upper canopy LAI (more young and mature leaves) increases during the dry season, whereas lower canopy LAI (more old leaves) decreases (Smith et al., 2019).” (In revision Line 83-86)

Reference:

Menezes, J., Garcia, S., Grandis, A., Nascimento, H., Domingues, T. F., Guedes, A. V., Aleixo, I., Camargo, P., Campos, J., Damasceno, A., Dias-Silva, R., Fleischer, K., Kruijt, B., Cordeiro, A. L., Martins, N. P., Meir, P., Norby, R. J., Pereira, I., Portela, B., Rammig, A., Ribeiro, A. G., Lapola, D. M., and Quesada, C. A.: Changes in leaf functional traits with leaf age: when do leaves decrease their photosynthetic capacity in Amazonian trees? *Tree Physiology*, 42(5), 922-938, <https://doi.org/10.1093/treephys/tpab042>, 2021.

Smith, M. N., Stark, S. C., Taylor, T. C., Ferreira, M. L., de Oliveira, E., Restrepo-Coupe, N., Chen, S., Woodcock, T., dos Santos, D. B., Alves, L. F., Figueira, M., de Camargo, P. B., de Oliveira, R. C., Aragão, L. E. O. C., Falk, D. A., McMahon, S. M., Huxman, T. E. and Saleska, S. R.: Seasonal and drought-related changes in leaf area profiles depend on height and light environment in an Amazon forest. *New Phytol*, 222: 1284-1297. <https://doi.org/10.1111/nph.15726>, 2019.